

THE CHANGING GEOGRAPHY OF THE COMMON BLUE BUTTERFLY (*POLYOMMATUS ICARUS*) IN NORTHUMBERLAND

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Introduction

Heath, Pollard and Thomas (1984) have described patterns of change in abundance and distribution for butterflies in Britain and Ireland. Many species show a decline in abundance or contraction of range, although a few species have recently increased in number and distribution. In Scotland the speckled wood (*Pararge aegeria*) has colonised the north-east since 1960 (Thompson, 1980; Barbour, 1986), and in northern England the orange tip (*Anthocharis cardamines*) has recolonised since the 1950's (Harper, 1968; Long, 1979). In Northumberland, the common blue (*Polyommatus icarus*) has had a highly variable distribution during the last 150 years, the most notable and encouraging feature of which is the extent to which the species has recolonised the county over the last twenty years. This paper describes the changing distribution of the common blue in Northumberland and attempts to account for the changes observed.

The Pattern of Distribution

1. *Distribution before 1950* (Figure 1). Records of the common blue are widespread from Northumberland for the period up to 1950. The earliest record dates from 1769, and in 1857 the species was described as:

“The most abundant of our small butterflies, appearing in every grassy lane and field at the end of May and continuing until early in July. A second brood in August and flies till late in September.” (Wailes, 1858).

This situation seems to have been maintained during the second half of the nineteenth century, the species occurring.

“Everywhere throughout the district except on higher moorlands”. (Robson, 1902).

Records from early this century come from throughout the county, but in about 1950 the species suddenly became restricted in distribution.

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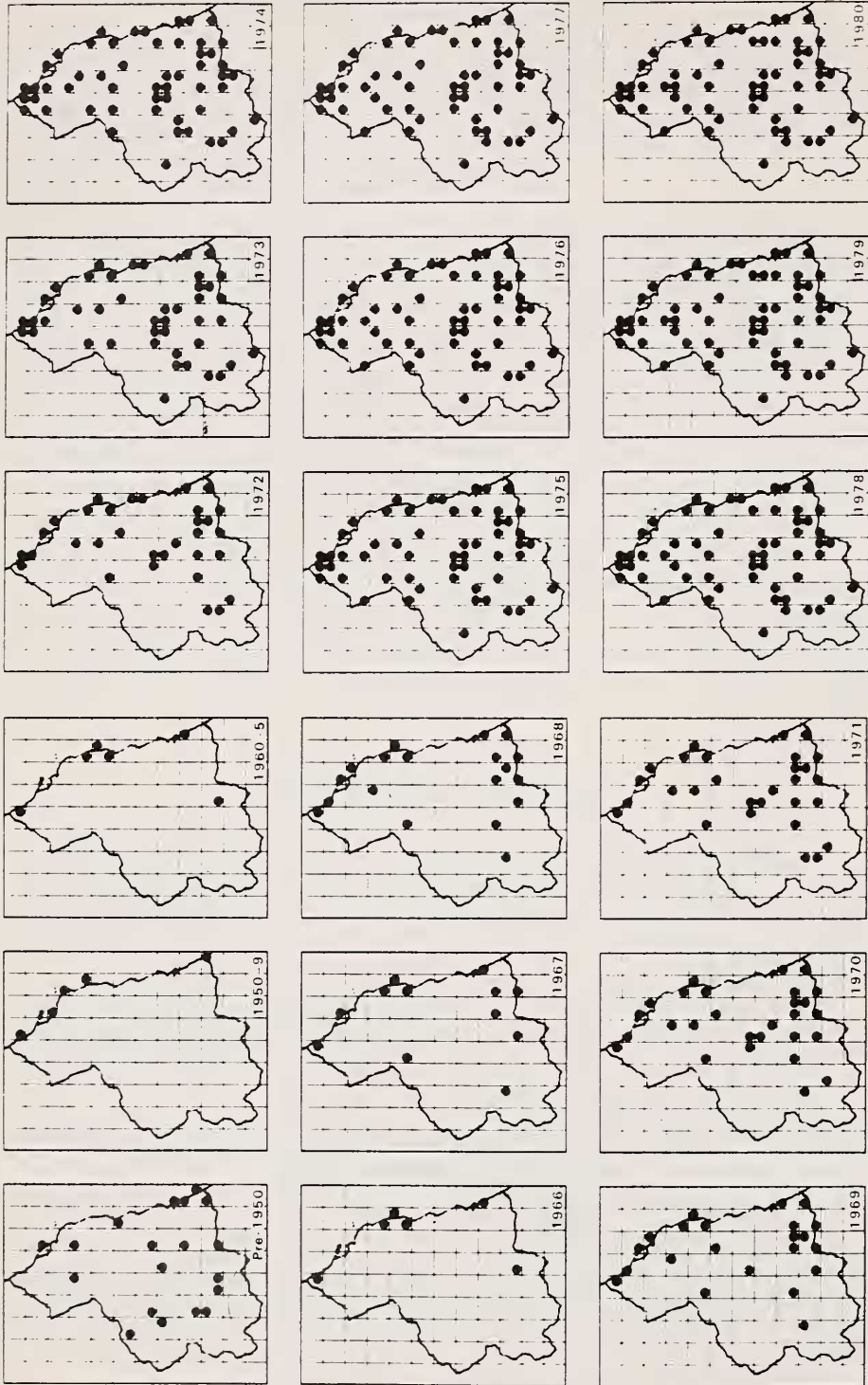


Figure 1. Distribution of records of the common blue in Northumberland from pre-1950 to 1980. Records are plotted on 5 x 5 km squares.

2. *Decline* : 1950 - 1966 (Figure 1). Between 1950 and 1959 the species was recorded only along the coast, principally in sand dune systems and particularly in the north between Berwick and Dunstanburgh, but with a single record from Tynemouth Priory in 1956. Between 1960 and 1966 records were still largely confined to the coast, a 1962 record from Riding Mill in the lower Tyne valley being the only exception.

3. *Increase* : 1967 - 1971 (Figure 1). During 1967 and 1968 the species began to recolonise inland areas of the county, recolonisation being centred on Tyneside and in the north of the county. In Tyneside, records came from Gosforth Park, Woosington and Wallsend, and there were also observations from Throckley, Newburn, Crag Lough and Barrasford in the Tyne valley. In the north there were fewer records, the species being found at Chillingham and in the Breamish valley. The species also increased along the coast, new records coming from Holy Island, Embleton, Seahouses and Budle Bay.

Between 1969 and 1971 the species built on, and extended, the areas colonised during 1967 and 1968. Records were more widespread, both along the coast and in Tyneside, and the distribution extended along the Tyne valley into both the South Tyne and Tyne valleys. The species was also recorded from the valley of the River Wansbeck, and, further north, in the valley of the River Aln. By 1971 the species had been recorded from Allendale, one of the main tributary valleys of the South Tyne system.

4. *Consolidation* : 1972 - 1980 (Figure 1). The pattern of recolonisation between 1972 and 1980 followed that established during the initial period of recolonisation between 1967 and 1971. The main routes for expansion continued to be the river valleys; by 1973 the species was recorded in Coquetdale and Redesdale, the latter being a tributary of the North Tyne. In the South Tyne system there was a record of from Allenheads in Allendale, this being at an altitude of 400m. By the mid-1970's therefore, all the main river valleys of the county had been colonised, together with much of the coastline, records from 1975 to 1980 confirming this pattern of distribution and showing the species to have consolidated its expansion.

Discussion

This sequence of change in distribution of the common blue raises several questions about factors influencing numbers and distribution of the species :

1. What was the cause of decline in the 1950's?
2. What initiated the sudden and extensive recolonisation in 1967/1968?
3. For what reasons are the river valleys the favoured route for dispersal?

1. *Decline.* Nationally, the common blue has decreased in abundance this century; this is largely the result of modern agricultural practices, particularly use of herbicides, which reduce populations of the larval food plant *Lotus corniculatus* in improved pasture and other grassland, and thereby reduce populations of the butterfly (Heath, *et al.*, 1984). Support for this being the possible cause of the post-1950 decline in Northumberland comes from the timing of the decline and the pattern of distribution in the county during 1950-1966.

The start of the decline coincides with the widespread introduction of synthetic herbicides and insecticides for agricultural use (Fryer and Chancellor, 1974; Sly, 1977). Mixtures of herbicides and insecticides have recently been shown to reduce common blue populations (Rands and Sotherton, 1986) through reducing populations of larval food plants (Sotherton, Rands and Moreby, 1985). Reductions in size of populations may be expected to be resolved locally into reductions in distribution.

Secondly, the pattern of distribution between 1950 and 1966 shows the species to have been restricted to coastal sand-dune sites which are free from agricultural activity and where *Lotus corniculatus* can grow without interference and support viable populations of adult butterflies.

2. *Increase.* Possible reasons for the initiation of the spread of the common blue are less obvious. Use of herbicides in management of roadside verges had begun to decrease by the late 1960's (Sheail, 1985) and it is possible that the spread of the common blue was the result of an increase in *Lotus corniculatus* as a smaller area of roadside was treated. Rabbit populations were also beginning to recover from myxomatosis by the late 1960's and their grazing may have reduced the competitive advantage of taller plants over *Lotus corniculatus* in rough pasture. Further, common blue records for Tyneside are principally associated with gardens, these being expected to contain fewer herbicides than either agricultural land or managed roadsides, and records from rural areas are confined to the main river valleys where the riparian environment may have provided sufficient habitat for the butterfly to have established populations and spread.

3. *Route of Dispersal.* The main route for recolonisation used by the common blue has been the river valleys, there being three reasons for this. First, *Lotus corniculatus* is confined to areas below 500m in Northumberland (Baker and Tate, 1868), and the river valleys fulfill this condition for much of their length. Second, the river valleys connect with the coastal areas, the main reservoir of the common blue between 1950 and 1966, and provide a continuous belt along which the common blue could spread, containing no barriers such as areas of high ground or abrupt changes in environmental conditions. Third, within the rivers there are many vegetated bars and floodplain sections which may recover quickly from agricultural pollution and provide areas of habitat suitable for the common blue within and through the improved agricultural areas of lowland Northumberland. This combination of a continuous lowland habitat offering little resistance to dispersal and connecting with the coastal reservoir of common blue populations is seen as the main reason for the river valleys being the routes of spread.

Summary

The common blue shows a clear pattern of changing distribution in Northumberland. Prior to 1950 the species was widely distributed in lowland parts of the county but suffered a major reduction in distribution between 1950 and 1966. This was possibly due to increasing use of agricultural chemicals which reduced populations of the larval food plant *Lotus corniculatus*. During this period the species was restricted to coastal sand dune sites. Starting in 1967 and continuing into the 1970's, the species began to recolonise the county using the river valleys as routes for expansion into, and through, the agricultural lowland; the river valleys offer little resistance to spread, and provide a continuous path containing sufficient suitable habitat for the butterfly to establish viable populations. It is suggested that initiation of the spread was due to an increase in the larval food plant *Lotus corniculatus* as a result of decreased use of herbicides and an increase in rabbit populations.

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